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A STUDY IN EPILEPSY.

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The history of this disease is ancient and of little interest; suffice it to say that it is on the increase.

Definition: Epilepsy is that form of eclampsia which has become a more or less persistent phenomenon. It is also a condition of constant irritability of the cerebral cortex, in addition to which it is characterized by attacks of partial or complete loss of consciousness, attended with or without convulsions. The latter may be general or focal (Jacksonian) essential, symptomatic or organic.

It is important to remember that epilepsy is a continued disease, and that the "attack" is only a part of the state of the patient. The latter may consist of momentary loss of consciousness, stare of the eyes or slight muscle rigidity, *petit mal*, or may be attended with partial or complete loss of mentality, followed by tonic then clonic convulsions lasting for a few seconds, and the patient usually being dull for some hours afterward. This is termed *grand mal*. In the fit the patient may bite his tongue, and during or after it the sphincters may be paralyzed. The attack may be ushered in by a more or less long premonition or by an aura. The latter is a psychic phenomenon immediately preceding the fit. Aphasia, paralysis from hemorrhage into the brain, or death from exhaustion following a series of attacks (status epilepticus) may result in rarer instances. Dementia may be a remote consequence. Notable exceptions to this occur.

There is, however, a tendency to progressive deterioration of the nervous system in epileptics, so that all forms of mental brain and spinal phenomena may be expected. The above are about all of what are considered cardinal features of this malady.

The recognized stages of an attack are (1) spasm of vessels (pallor); (2) relaxation (convulsion); and (3) recovery.

The authors have made an analysis of 315 cases of epilepsy with the hope that such a study may be of some fruition in the better understanding of the disease, and more remotely toward the treatment which is at the present day so futile in the majority of cases.

We have tabulated 304 cases from the Infirmary for Nervous Diseases, reporting since 1889; 7 cases from the Nervous Clinic at the Howard Hospital, through the courtesy of Dr. J. Madison Taylor, and four cases of unusual interest occurring in private practice. To this analysis several cases will be added that do not appear in the tables.

TABLE I.

- (A) Definite auras recorded in 315 cases of epilepsy.
- (B) Initial sensations or movements exactly determined.

A.

Abdomen.....	4
Aphasia.....	16
Anger (sudden outburst).....	1
Blood to head (sense of).....	3
Contraction (both hands).....	2
" (right hand).....	1
" (general).....	1
Chewing smoke (sense of).....	1
Coldness (general).....	2
" (extremities).....	3
Fingers and teeth enlarged (sense of).....	1

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Globus.....	13
Dizziness or vertigo.....	10
Dreams.....	1
Delusions (struck on head).....	1
" (turning into skeleton).....	1
Hallucinations (visions).....	3
" (smell).....	3
" (hearing).....	8
Fear (morbid).....	6
Faint feeling and palpitation.....	9
Nervous or restless.....	7
Paræsthesia, extremities.....	4
Sensation of (trembling).....	5
" (twitching).....	4
Stomach (nausea or (definitely) (distress).....	22
Vague premonition.....	12

144

Total auras was 144, or in about 46 per cent of the 315 cases.

The most frequent aura was stomachic (in 15 per cent) of auras noted; the next frequent aphasia; next "vague" sensations.

B.

Of short or long duration, i. e., premonitions.

Breathing, spasmodic.....	1
Calls, aloud.....	5
Clothing (pulls at) 1 hour before attack.....	1
Dull or vague sensation (day or more).....	10
Eyes twitch.....	1
Eyes (rubs).....	1
Excitement (preparoxysmal).....	1
Hiccough.....	1
Head (turning to side).....	2
Head (pain several hours before attack).....	5
Head (feeling of heat in attack).....	1
Muscular rigidity (2 days).....	2
Moans.....	1
Moves about incoherently.....	9
Sensations some hours, pain localized.....	4
Talks incoherently.....	4
Throat (catches at).....	1
Tongue (bites at) at times can stop attack.....	1
Vomits.....	1

Initial sensations in 53, or in about 17% of cases.

In the above tables the aura is used in its legitimate sense of a sensation immediately, or within a few seconds, preceding a seizure, and yet not a part of the epileptic fit. It is frequently most difficult to differentiate between an aura and an initial increment, or part of the attack itself. The value of such definite knowledge is desirable in a given case when it is known that a fit may at times be stayed after the aura occurs, by the patient or other person. Thus in one case tying a binder firmly around an arm would stay an attack. In one case, too, the initial movement of biting the tongue frequently awakened the man who at times could mentally inhibit the attack.

This man, æt. 50, is an exceptional case of essential epilepsy, which began by attacks of "absent-mindedness" at 33 years of age, and which he affirms after a trauma upon the parietal region, developed into *petit mal*, of which from 5 to 21 have occurred daily for the past 18 years. During this time he has had only eight major attacks and these have all occurred while asleep, between 3 and 4 A. M. He used to have intermittent bleeding piles. The man has a remarkable memory—is very intelligent, and insists that when bleeding from the piles the attacks were much less frequent. Was it due to unloading turgescient blood vessels? "Catching cold" in the bowels or indigestion from food have always been precursors of the major attacks—a *post hoc ergo propter hoc*. An aura in this case, which is inconstant is of the singular delusion that the last thing that he has done "God will punish him for." As to treatment, the late Dr. D. Hayes Agnew had advised cutting down upon the skull, but no fracture being found, the bone was not trephined. It should be said there were no focal symptoms. The operation did not help him. Recently, under the care of Dr. H. C. Wood and Dr. Grayson, he has had a chronic nasal disease treated without benefit to the attacks.

After we had treated him without avail for some months, lavage was instituted. This has afforded some relief to gastric distress, but has had no material effect upon the attacks. The man is in excellent physical and mental health otherwise.

Dr. S. Weir Mitchell saw the man with us, and confirmed the moderate continuous use of trional. (He has taken large doses of bromides for years with little benefit.)

We have advised the man getting back to work, as a skilled mechanic, as an aid toward inhibition. The fact that his *grand mal* has only occurred at night makes this advice the more tenable. A letter under date of May 3, 1897, says: "Dear Sir: I am located as above, and busily engaged at my legitimate following. I am having one or more minor

attacks every night, but little sign of a major one. I awoke once or twice since coming here and caught myself in the act of biting my tongue. I am using the tube and washing out my stomach once a week and taking the trional regularly. I am very anxious concerning the major attacks, fearing their return. I do wish some definite remedy could be found. With kind regards, I remain, yours very truly,

“J. H. T.”

This letter is quoted in full to show the very good mental condition of the patient. There is no neurotic heredity in this man's family. We have no doubt that overstrain of mind while in charge of a large woolen mill was the inciting cause of this case of idiopathic epilepsy. The man made his very excellent memory the storehouse for everything. Would a note-book have been a preventative?

That attacks of indigestion add to the seizures we cannot doubt. We propose getting rid of this source of reflex disturbance in the hope that the seizures will be stayed. What will cure him?

We are indebted to Dr. S. Weir Mitchell for the suggestion of a more thorough study of auras in epilepsy, but unfortunately the records are not in detail in many of the cases, so that we shall continue this research.

CASES OF OTHER PECULIAR AURAS.

In one case a peculiar odor of flowers ushered in the fit. Another case had an odor of some indescribable substance which was associated with a sweet taste in the mouth.

CASE OF EPILEPSY WITH OPHTHALMIC AURA—
VISION OF A HIDEOUS FACE.

Mrs. A., aged 40, has three children and has had three miscarriages. There is no neurotic family history, and she has never been subject to headaches. From the age of 9 or 10 years she has had attacks in which everything seems far off, or, as she expresses it, “like looking through the large end of an opera glass.” There always appeared in these attacks a face with unpleas-

ant expression, which was very distinct for a time, but gradually faded away.

She was not unconscious during the attack, but felt powerless to move or exert herself, and would call to any one in the room to shake her, so that she might regain self-control. The attacks continued with greater or less frequency until November, 1889, when she had an attack of epilepsy (*grand mal*) in her sleep. Again, in April, she had another attack while driving in her carriage. These are the only attacks of *grand mal* which she knows of having had, and both were preceded by the vision of the unpleasant face.

TABLE II.
(Exciting Causes.)

Causes assigned as definite in 315 cases.

Alcohol.....	5
Anger.....	1
Adherent prepuce or phimosis.....	3
Bowels (diarrhœa or dysentery)*.....	3
“ (constipation).....	2
“ (worms).....	3
Convulsions of childhood (dentition).....	15
Dissipation.....	2
Diphtheria.....	1
Disorders of menstruation.....	6
Fever (simple).....	1
“ (typhoid).....	2
Fright.....	15
Grief or worry.....	7
Insomnia.....	2
Influenza.....	1
Indigestion.....	10
Lightning stroke.....	1
Masturbation (male).....	3
“ (female).....	1
Measles.....	1
Meningitis.....	2
Miscarriage.....	1
Overwork.....	5
Pertussis.....	1
Pregnancy.....	3
Scarlatina.....	1
Sea-bathing.....	1
Stone in ear.....	1
Sexual intercourse†.....	1
Sore throat irritation.....	1
Sun heat.....	2
Tonsils, enlarged.....	2
Tobacco (smoking).....	3
“ (chewing).....	2
Trauma (head).....	19
“ (arm or foot).....	2
“ (miscellaneous).....	10
Vaccination.....	1

Total 144, or in 46%.

*Besides being a cause of the original attack, both diarrhœa and constipation may excite individual attacks, as does gastritis.

†Case reported.

We have confirmed the reputed cause for night-terrors, being preputial irritation and enlargement of tonsils in a number of instances outside of this analysis. Night-terrors being in large part curable when the existent gastro-intestinal irritation is also relieved, we excluded it from the category of epilepsy on that basis alone, admitting, however, that it is evidence of reflex irritation of the central nervous system which may, when uncorrected, pass into true epilepsy.

It will be seen that grief or worry are the assigned causes in seven; that convulsions in childhood come high in the list, with fifteen cases, as does fright with an equal number; that indigestion is given as a cause in ten cases, and that disorders of menstruation are given in six, while trauma to the head has the greatest number of recorded causes, nineteen; but the latter must be slightly regarded as we know in all cases of essential epilepsy that injury or other supposed causes are only the excitation of a predisposition.

Convulsions of childhood are, in the majority of cases, *bona fide* primal causes. In the lesser number the neuron irritability is, no doubt, congenital and the dentition fires the ammunition. Such eclampsia in children, the result of teething, are more prone to leave a lasting epilepsy than the puerperal eclampsia in women, for example. This must be due to the greater instability of the not fully evolutionized neuron of the infant as compared with that of adolescence. We do not know of a case of puerperal convulsions that recovered having epilepsy as a sequel. Specific disease is not so frequent a cause as is assumed. In a private case of an adult male, however, we note a prolonged drunk and resultant alcoholic fit causing true epilepsy, the attacks recurring at irregular intervals, mostly at night, and increased in force and frequency when he is drinking.

TABLE III.

A, b, c, d, e, f, g, h, b', b'', i, j (215 cases).		
(a) Heart.	(b) (brain tumor case)	(j)
Excitable..... 3	Eccentric pupils... 1	Chest and Lungs:
Feeble heart..... 3	Fundi hazy..... 5	Pigeon breast..... 3
Feeble pulse (especially)..... 4	Pupils constantly dilated..... 4	Flat chest..... 6
Feeble and prolonged..... 3	Sluggish pupils..... 13	(No tuberculosis of lungs noted in any case.)
Overacting..... 2	Es or Ex phoria... 6	
Murmurs } systolic	(b)	(c) Sex.
apex..... 15	(b) Blood, average of:	Males..... 134
basic... 4	H—75 per cent.	Females..... 181
Rapid..... 3	r, b, c—5,068,780	Total..... 315
Venous hum..... 3	w, b, c—7,020	
Valvular sounds... 1		(d)
		Pale looking all the time..... 52
41	(b')	Consciousness in attack, i. e., convulsion only..... 7
(e) Unconsciousness (profound) without convulsive movements..... 20	(b'')	Pal or alone as an attack..... 1
	(f)	(g)
(h) Eyes.	Dazed only and pale in attack, i. e., convulsion with partial consciousness..... 2	Flushes in attack... 10
Astigmatism and Hypermetropia.. 7		Blue in attacks..... 5
Contracted field... 1		(i)
Disc } too red... 3		Sleeping spells alone..... 2
choked... 1		(Narcolepsy)

The above series of tables show the heart to have been affected in 41 cases, or 13 1-3 per cent. In the total number (315) 52 were pale looking. The average blood count shows, if any, a chlorotic type of anemia when existent. Proportion of males to females, about 1 to 1 1-3. Eye lesions bear no weight in the vast majority of cases. This view is upheld by de Schweinitz. When occurring this reflex source of irritation should be corrected. (a) It is surprising the few cases in which even enfeeblement of cardiac action is recorded in the 315 cases. The systolic murmur heard at the apex in 15 cases is a very small number indeed, and can be wholly attributed to other definite causes.

(b) Anemia is an inconstant condition in epilepsy.

(b') Seventeen per cent. of the cases appeared pale. The question of a probable quantitative anemia, it would seem, cannot be settled.

(b'') The one case of sudden pallor alone must be extremely rare. It perhaps presents the first stage of the attack only, i. e., spasm of the peripheral vessels. How soon this case will become a frank epilepsy will be interesting to watch, should not a happy cure follow treatment.

(c) Pelvic and menstrual disorders may count for the slightly greater number of epileptics in females of the total 315.

(d) The occurrence of consciousness with convulsions of a definite nature and for long years' duration cannot exclude the case from the category of epilepsy.

(e) It is equally uncommon to note prolonged unconscious attacks without convulsion.

Of course, all these cases are to be diagnosed carefully from hysteria, hystero-epilepsy and stages of hypnotism.

(f) The convulsion with partial unconsciousness is also infrequent.

(g) The primary flushing or cyanosis are exceptions to the rule.

(i) The recently described "narcolepsy" is a good title for sleeping spells which occurred in two cases.

Stigmata of degeneration are evident in hereditary epilepsy and less in acquired epilepsy. They consist of asymmetry of head, ears, etc. Lapses of memory and slow conceptions are the most marked mental states in the epileptic interval.

TABLE IV.
(315 Cases.)

(a) Intelligence.	
(61%) fair (assumed when not in notes so stated).....	192
(19%) bright.....	62
(17%) poor.....	50
(3%) imbecile.....	11

Total.....	315
(b) Aphasia after attacks, and when fully awake.....	
Brain tumor.....	1
Stupid, very, after attacks, for hours.....	13
Scars (face).....	15
" (extremities).....	26
Spastic paralysis is co-existent.....	9
Trephined (result) (benefit).....	3
" " (no benefit).....	4
(c) Disposition, changed to bad (depends upon stage).....	
Memory (very good).....	1
" (medium).....	12
" (poor or bad).....	34
Precocious.....	10
Imbecile and epileptic.....	11
(About 25% of imbeciles have epilepsy.)	
Abnormal appetite.....	3
Epileptic fancies.....	100
Headaches severe after attacks.....	20
Nutrition (good).....	50
" (bad).....	76

Nutrition otherwise fair; also color good.
(d) Uncommon sequels of attacks of epilepsy in 315 cases.

Delusion of turning into a skeleton.....	1
" " his brother having struck him.....	2
" " God going to punish him for last act done preceding attack, ever so simple.....	1
" " snake at his throat.....	1
Dreams much after for few nights.....	2
Post epileptic mania with visual hallucinations	1
(e) Cases bled in status epilepticus.....	1
(Result good.)	
(f) Cases bled after severe attacks.....	1

In the two latter cases the blood was very dark and hypo-toxic. In a number of cases the urine was hypo-toxic.

In only six cases was intelligence, disposition and memory well balanced.

(a and b) Our cases are presumably of the average severity, since they have, in the majority of instances, been brought to the clinic many times. Therefore we are not dealing with the severe types in the main, as are seen in hospitals for the epileptic. One hundred and ninety-two cases, or 61 per cent, are recorded as of fair intelligence; 19 per cent as bright; 17 per cent as of poor intelligence; and only 3 per cent as imbecile. The latter were of cases beginning at birth in imbecile children, about 25 per cent of whom have epilepsy complicating.

Aphasia following complete recovery of mentality occurred in three cases, while prolonged stupidity was ascertained in only 13.

Scars, the result of injury during attack, were recorded in 41 cases. The above references in these cases point out the conservatism of nature in restoring function which is almost unthinkable; and confirms the opinion we hold that irritability of the co-ordinating centers alone is the predisposing cause of the vast proportion of epilepsies.

Spastic paralysis (cerebro-spinal palsy of childhood) existed as the organic cause of epilepsy in 9 cases. One of them was due to brain tumor.

(c) Disposition was changed or notably bad in 26 cases. The memory was extremely good in one (detailed above) and was bad in 34. Memory is usually disproportionately lost as compared with intelli-

gence. Are certain neurons (those of perception) made more sluggish than others (those of conception)? (See Dr. Sinkler's reference of case, *Journal of Nervous and Mental Diseases*, December, 1896.)

There were notable perversions of appetite in three cases; about one-third of the cases presented that dejected, bromide eruption covered face, known as facies epileptica. In six cases of at least a half a dozen years' duration, known to the authors, such stigmata in the face was entirely wanting; in one of them, a girl of 18, with frequent attacks, her mental and physical health were excellent.

These cases are rare, and forces the conclusion that epilepsy, chorea and other psychoses are often only inherent irritability of the central nervous system, and that bacteria or other circulating poisons are the rarer causes of this irritability—*ergo* that the treatment must be in advising proper control of the nervous system down the generations, so that the progeny may assume a normal development.

The systematic treatment will be referred to later, and is of especial value only in acquired cases.

Nutrition of body was recorded good in 50 and bad in 76 cases. The remaining 189 presented average physiques.

(d) Dreams which we know are sleep produced, and which occur at times before and after attacks, during sleep, supports our view that not only is the lowered power of inhibition of the general nervous system a cause of more frequent severe attacks during dark hours, as pointed out by Langdon and Witmer, but that the fact of sleep itself being the main element of this lessened inhibition, is proven when it is known that more severe attacks occur while sleeping. One case had a day attack, only while sleeping. Waking epileptics at the hour of sleep of an expected attack may prove of some value in prophylaxis of the spell.

(The cases bled were for Dr. S. Weir Mitchell who, with Dr. Stewart, of the Hy-

gienic Laboratory, University of Pennsylvania, is making an extended research in this direction.)

TABLE V.

		Number of attacks.			
No. with daily attacks of:		No. with weekly attacks:			
Petit Mal.	Grand Mal.	Petit Mal.	Grand Mal.	Petit Mal.	Grand Mal.
41	20	2		44	
a. follows in No.	Seldom more than two daily.				
Attacks.	Cases.	No. with monthly attacks.		No. with yearly attacks.	
1 to 4.....	4	Petit Mal	Grand Mal	Petit Mal	Grand Mal
1 to 5.....	2	2	22, or	0	3
2.....	4	in 16 7-17 per cent. of female cases.			
3.....	7				
4.....	7				
4 to 5.....	2				
5.....	1				
6.....	1				
7.....	1				
8.....	1				
10.....	4				
10 to 20.....	1				
18 to 20.....	1				
6 to 12.....	1				
15.....	1				
10.....	1				
20.....	1				
25.....	1				
30.....	1				
Total cases.....	41				
		(B) Heredity traced:		(C) Complicating chorea:	
		Insanity.....26		Minor.....5	
		Epilepsy.....50		(D) Sphincters relaxed after or in attack:	
		Othe neuroses.....75		Bladder.....199	
		(E) Patients have conditions which excite attacks (stated by relatives).....121		Powel.....27	
				(F) Paresis after attack.....7	

(A) Forty-one had daily attacks of *petit mal* and ranging from one to seven as an average. (One case as high as twenty on some days.)

Twenty cases had daily attacks of *grand mal*, and seldom more than one. Two had weekly attacks of *petit mal*. Forty-four had weekly attacks of *grand mal*. Two had monthly attacks of *petit mal*. Twenty-two, or 16 7-17 per cent of the female cases, had monthly attacks of *grand mal* related and unrelated to the menstrual epoch in equal proportion. (Seven cases were influenced by pregnancy.)* Three cases had one attack a year.

(B) Heredity was traced in 47 per cent of the 315 cases.

(C) Five cases had chorea minor, complicating at some stage of the disease. The wonder is that it is not more frequent; that other periodic neurosis migraine was not noted in any of the cases.

(D) The sphincters were relaxed after an attack in 71 per cent.

(E) In 38 per cent were causes of exciting attacks given.

* (See "Protean Influence of Pregnancy on Idiopathic Epilepsy.")

* (See "Transactions Philadelphia County Medical Society," 1896.)

age. The menopause had no influence upon the recurrence of the attacks, because this did not take place until she was 51 years of age. She came under my care in 1894. The attacks occurred at intervals of from six weeks to two months. She was ordered bromide of strontium, and had no attack for fifteen months, and during the year following she had but two.

CASE SECOND.—FOUR YEARS' INTERVAL.

T. H. M., male, aged 29 years, came under my care August, 1890. For nine years he had had attacks of nocturnal epilepsy, and usually in the early morning. He had one attack during the day when he was asleep. Under carefully regulated doses of bromides the attacks lessened in severity, and the last attack he had occurred on the night of July 4, 1892. When last seen, September, 1896, there had been no recurrence of the attacks.

CASE THIRD.—TWENTY-ONE YEARS' INTERVAL.

A. W. H., male; aged 42. When 12 years of age he began to have attacks of epilepsy. Some of the attacks were *petit mal*, but the severe attacks also occurred at frequent intervals. Most of the attacks were nocturnal, but they also occurred in the day. At times he would fall from three to four times in a day, and at other times there would be intervals of from two to three weeks, when he would become better. In 1871, that is, five years after the beginning of the epilepsy, the attacks ceased. The patient had been taking a preparation of bromide of ammonium with belladonna, and after taking the preparation for three or four days, there were marked symptoms of belladonna poisoning—dilated pupils, mental excitement, and flushing of the skin. There was no return of convulsions from this time, that is, the age of 17, until he was 38 years of age, three years after his marriage. The attacks began as *petit mal*, but after two years he had a general convulsive seizure. The attacks have continued with greater or less severity until the present time.

(B) Of the ten cases, cited in the table, who had only a very few attacks, in all but two attacks they occurred at night.

(C) The younger case, a male, aged 23, it was not noted as to particulars of his death.

In the instance of the woman, aged 63, who also died in status epilepticus, it had been a developmental case, said to be due to anxiety and occurring after maturity (and long after the birth of her only child, a feeble woman who is the mother of the girl mentioned below).

This patient, æt. 63, had become blind some six years before death, but her mind remained fairly good up to the last. The fact that the granddaughter was recently seen in a neurasthenic and hysterio-epileptic state from prolonged nursing of the grandmother, makes the genesis more clearly perceptible in both, as being a combination of neurophatic diathesis plus mental strain.

(D) 16 2-3 per cent are recorded as having constantly the initial cry; 21 per cent are cases of tongue biting in the spell.

An occasional cry was recorded in 17 cases. An occasional tongue biting was recorded in 16 cases. In two cases it was specifically stated that tongue biting never had occurred.

(E) Shows ten congenital cases, sixteen beginning during first year of life; 19 during the second year; 16 during the third year; 15 during the sixth year; 14 each during the tenth and fourteenth and eighteenth years.

(F) The longest duration of epilepsy was 63 years (one case). The next longest was 42 years (2 cases); 35 years (three cases); 33 years (one case). The least duration is one year (30 cases), and three years 30 cases.

Diagnosis. The diagnosis of epilepsy must be made from the transient eclampsia. If the attacks soon cease, and there is evident cause, we may exclude epilepsy.

From hysteria—the great preponderance of hysteria in females, the persistence of par-

tial consciousness in spite of denial by the patient, and the irregular nature of the clonic spasm, are points.

From hystero-epilepsy it is not to be positively differentiated, if we admit this disease to be a combination of hysteria and epilepsy. Hysteria is a frequent accompaniment of epilepsy, and in hysterical patients the true epileptic attack may be overlooked.

Cataleptic states are told by the history of the case. The effects of pressure on hysteric zones so called may aid diagnosis.

It is folly to claim ability to make a positive diagnosis on the spur of the moment in a minority of cases.

Chemical analyses of the excretions and secretions, and of the blood changes are to be noted and placed in their proper standing, as diagnostic marks, in obscure cases. Confusion sometimes exists as to apoplectic convulsions or to uræmic convulsion and epilepsy. The history and the conjugate eye deviation and paralysis in the first, and duration of fit and urine—the examination in Bright's disease would clear up such possible error in the second.

Prognosis.—As to cure is bad, in the large majority of epileptics. Organic brain cases are, of course, from the first unpromising. Where evident lesions of any sort are found in a given case of essential epilepsy, this should be corrected as getting rid of a reflex excitation, and timely benefit has been had by such treatment. Indeed, cures have been effected, as in one case of circumcision under our care. Prompt action should be resorted to in these cases, if recovery is ever to be hoped for.

After the convulsive state is once profoundly established, it seems futile for us to hope for more than decided amelioration.

A large number of epileptics, to our surprise, live many years in average health.

Pathology.—The pathology of organic epilepsy depends entirely on the organic brain disease (tumor, fracture of the skull, meningitis).

Essential cases of moderate severity will show no pathological change of the nervous system. Later they are also apt to develop overgrowth of blood vessels of the brain, and then follows fatty degeneration of the cerebral neurons, dilatation of the perivascular lymph spaces and overgrowth of the neuroglial tissue. These are in co-relation with the changes as found in the fundus of the eye in advanced cases of idiopathic epilepsy, as pointed out lately by Oliver.*

Lloyd Andriezen recently spoke of the "Pathogenesis of Epileptic Idiocy" as being a loss of contour and a mycrogyri with localized sclerosis, as compared with non-epileptic idiots where the aforesaid changes are not found.

Treatment.—As pointed out above, the condition must be battled with along the lines of heredity. The history of this disorder being in a family should interdict marriage. The history of insanity should do likewise. This hope may be only partially realized, we admit. Hygienic care of the patient should be enjoined. Attention to reflex disturbances in any of the special senses should be well worked out and corrected. Especially should diet and idiosyncracies of the patient as to food be guarded. Indigestion is, no doubt, an exciting cause of epilepsy and of attacks. Gastro-intestinal therapeutics is of great value. Lavage has an important place in the therapeutics of epilepsy, as pointed out by Herter and Rachford. Intestinal antiseptics, as potassium permanganate and salol, do especial good in those cases which have fermentative dyspepsias.

Bromides are the standard remedy to stay the spells, and should be given sparingly. Many cases have the disease "bromism" engrafted upon the epilepsy by want of care of the physician.

Digestants will often aid in lessening attacks, as much as any cerebral depressant.

*Relation of Ophthalmoscopic Findings to Disease of the Cerebral Cortex, *University Medical Magazine*, March, 1894.

Indeed, strychnine may be indicated where atony of the general system obtains.

Other drugs that have been of service as substitutes for the bromide treatment are trional, *Solanum Carolinense*, etc., and finally Flechsig's opium treatment may do good in exceptional instances.

Hypnotism deserves mention as a possible means of relief of epilepsy, but has not as yet, been used enough to more than be a trial. Like all new impressions upon an individual case, it may do good, temporarily at least.

In view of the recently advanced theory of motility of the neuron, and assuming this to be the cause of essential epileptic convulsions, hypnotism is worth a wide investigation.

Specific treatment should be judiciously employed where syphilitic origin is suspected; but this should not be persisted in to disorder the gastro-intestinal tract and other functions.

Trephining will be indicated in fracture and superficial neoplasms. Post epileptic manias should be watched for as a guard against homicide. Commitment to an asylum may be a *dernier resort*.

After all our care in treating this disease, it will be found that to our surprise a small percentage are cured, and a very large amount of amelioration of the severity and frequency of attacks is accomplished.

So we see that the treatment of epilepsy, while one of the *opprobria* of medicine, has a promise for even better results in the future.

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DISCUSSION.

Dr. Louis J. Lautenbach (Philadelphia): In connection with this paper I would very much like to know from Dr. Pearce whether he has, among his cases, met with any in which the peripheral irritation was resident either in the nose or ear? In my medical work of the past sixteen years (of course it has been special work almost exclusively), I have met with some four or five cases of epilepsy, in which the spasmodic attacks disappeared after thorough and efficient treatment directed to diseased nasal cavities connected with ear disease—cases of nasal-polypi and hypertrophies; with ear disease of a catarrhal or scleroid type attended by tinnitus and deficient hearing.

Of these cases one woman was treated some eight years ago, and when last heard from had, for about a year, been completely free from the epileptic attacks which previously had occurred about every four weeks and had persisted for a period of years, some six years, I believe. At present I have among my patients in Philadelphia a man coming from one of the suburban towns surrounding Pittsburg, who came to me some seven months ago upon the advice of his family physician, who had previously written me describing it as a case of nose and ear disease, accompanied by epileptic attacks at intervals of from three to six weeks, for over two years. I had answered his letter telling him that there was a possibility of a connection between the spasms and the local disease, but no assurance of it; and if he would bring him to

Philadelphia we might perhaps come to some more definite conclusion.

On examination I found the patient a large, heavy, full-blooded man of over sixty, who had for years led what might be called a too active life, physically as well as mentally; especially the latter, his mind never being at rest, but always being directed to the solving of problems, especially mechanical ones. He had for years noticed diminished hearing with increasing tinnitus. This for months had been located, not only in the ears, but was referred by him to the occipital region as well. The drum heads were thickened and retracted, and without perceptible motion. The ossicles were ankylosed in the left ear, where the noises were the most disagreeably loud and persistent. The drum head was attached to the promontory. The hearing was very deficient, being practically absent in the left ear. The nose was pretty effectually blocked by a general thickening of the mucous membrane with hypertrophies.

This gentleman was put under massage ear treatment, and thorough nose treatment, including the electro-cautery. From the time the treatment was once thoroughly instituted until the present time, he has not had any symptoms indicating a return of the epileptic attacks. Originally he was treated daily by me for some four weeks, and since then he has returned to me some three times, remaining with me about ten days each time. He has, however, continued the pneumo-phono massage, treated daily at his own home, with one of my machines. In addition to this local treatment I put him on internal remedies, such as ergot and salicylate of soda; but at no time since the treatment was instituted was a bromide or any nerve-depressant or sedative used. Throughout my aim was to restore the local parts, the throat, nose and ear, which I was requested to cure, to as normal a condition as possible, hoping that by the relief of these points of local irritation it might serve to overcome the liability to the central nervous explosion.

I know not what the future of these cases may be, but know that the treatment has been followed by results unexpected. I be-

lieve if the peripheral irritating foci can be overcome many of these cases can be relieved; and if no severe peripheral irritation stimuli are sent to the brain, they will remain well.

I have given these cases from the standpoint of the ear specialist, and must look for a more thorough and satisfactory explanation from that other advancing field of medicine—that of neurology.

Dr. Kane (Kane): I would like to ask Dr. Montgomery's opinion about the benefit arising from these operations.

The President: I have never seen a case benefited in any way. Possibly for a short time after the operation the length of intervals between attacks would be slightly increased, but subsequently the attacks would be more frequent than ever. There is no class of cases which offers less encouragement to the operator than these.

Dr. F. Savary Pearce (Philadelphia): The term neuron in modern nomenclature refers to what we formerly designated the nerve cell. We have amplified our knowledge of the histology of the neuron so that it is known to consist of the body and of many prolongations (end tufts) extending off from the axon (axis-cylinder process).

As regards the effect of ear disease, and especially tinnitus, which Dr. Lautenbach refers to, I certainly do think that such disturbances may be exciting causes of epileptic attacks in those who are predisposed to epilepsy, or may be the exciting cause of more frequent attacks where they have been already established. I am sure persistent, careful treatment of naso-pharyngeal disease has lessened attacks in some cases we have seen. This subject is embraced in the large field of "reflex" causes (as is eye lesion, phimosis, etc.), and should be carefully considered in treating cases of epilepsy (even idiopathic cases) if we are to hope for the best results.

In by far the larger number of cases as pointed out also in the paper, the attacks are reflexly excited by disturbances in the gastro-intestinal tract, which irritation acts as the spark to the loaded gun. The general practitioner and specialist should work in harmony in the treatment of epilepsy.